

Cree® XLamp® LED IES LM-80-2008 Testing Results

Revision: 1 (May 31, 2011)



NVLAP Lab Code 500041-0

INTRODUCTION

This document provides the results of Cree’s IES LM-80-2008 (“LM-80”) testing on XLamp LEDs. Cree is providing this data so that the public can verify the reliability of Cree LEDs as part of a complete LED lighting system.

Note that this document only provides the end results of the LM-80 tests. This is not a complete LM-80 report. Do not use this document to submit luminaires or lamps to an agency. Cree customers who need the full LM-80 reports should contact their Cree sales representative.

Cree’s customers who wish to share LM-80 results with their customers have permission to link to this document from their website. This document is subject to change without notice, so please do not link to a local copy.

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NVLAP ACCREDITATION FOR LM-80-2008 TESTING

Cree's SSL testing laboratory in Durham, NC, USA is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) to perform IES LM-80-2008 testing. All LM-80-2008 results produced by Cree are generated in Cree's accredited laboratory. A copy of the accreditation certificate is provided below.

Approved Signatory:



Amber Abare
Cree Components Reliability Laboratory Manager



United States Department of Commerce
National Institute of Standards and Technology

NVLAP[®]

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 500041-0

Cree SSL Laboratory
Durham, NC

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:

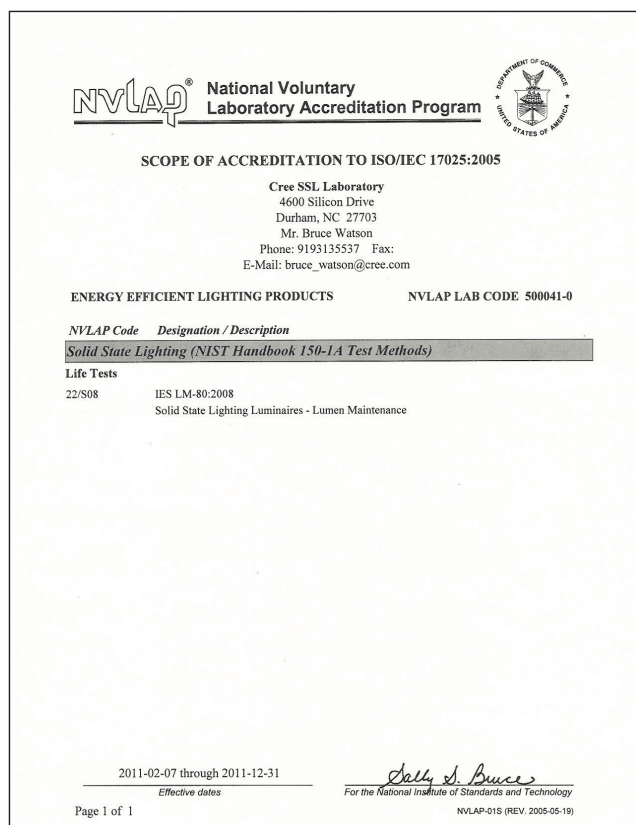
ENERGY EFFICIENT LIGHTING PRODUCTS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAP Communiqué dated January 2009).*

2011-02-07 through 2011-12-31
Effective dates

Dolly S. Bruce
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



NVLAP[®] National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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ENERGY EFFICIENT LIGHTING PRODUCTS NVLAP LAB CODE 500041-0

NVLAP Code Designation / Description
Solid State Lighting (NIST Handbook 150-1A Test Methods)

Life Tests
22/S08 IES LM-80:2008
Solid State Lighting Luminaires - Lumen Maintenance

2011-02-07 through 2011-12-31
Effective dates

Dolly S. Bruce
For the National Institute of Standards and Technology

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XLAMP MC-E WHITE LEDS (REV 0)

Revision: 1 (December 8, 2010)

1. Number of LED light sources tested	<i>See individual test reports.</i>
2. Description of LED light sources	XLamp MC-E White LEDs (MCE4WT) & XLamp MC-E EasyWhite LEDs (MCEEZW) All measurements provided are LED package measurements with all LEDs on simultaneously.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED packages are driven at constant current.
5. Ambient conditions	LED packages are operated in environmental control chambers. The temperature of the ambient air around the LED packages is actively controlled by air flowing through the chamber. T_A : <i>See individual test reports</i> RH : < 45% Air flow : 800 CFM
6. Case temperature	The case temperature measurement point is shown in the XLamp MC-E Soldering & Handling document (AP21).
7. Drive current of the LED light source during lifetime test.	<i>See individual test reports. The drive current used during lifetime testing is listed as "Drive Current."</i>
8. Initial luminous flux and forward voltage at photometric measurement current	<i>See individual test reports. The drive current used for luminous flux, forward voltage and chromaticity measurements is listed as "Measurement Current."</i> The forward voltage measurements provided are for the series connection of all LEDs in the package.
9. Lumen maintenance data for each individual LED light source	<i>See individual test reports.</i> Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	<i>See individual test reports.</i>
12. Photometric measurement uncertainty	Cree maintains a tolerance of ±2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	<i>See individual test reports.</i> Ambient temperature during chromaticity testing set to 25°C ±2°C.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _f]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift ($\Delta u'v'$) at 6,000 hours
1	45°C	45°C	350 mA	98.1%	0.0009
2	45°C	45°C	700 mA	99.0%	0.0015
3	55°C	55°C	350 mA	98.4%	0.0010
4	55°C	55°C	700 mA	95.8%	0.0027
5	85°C	85°C	350 mA	98.2%	0.0014
6	85°C	85°C	700 mA	92.8%	0.0070

XLAMP ML-E WHITE LEDS (REV 0)

Revision: 0 (December 21, 2010)

1. Number of LED light sources tested	<i>See individual test reports.</i>
2. Description of LED light sources	XLamp ML-E White LEDs (MLEAWT) All measurements provided are LED package measurements.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED packages are driven at constant current.
5. Ambient conditions	LED packages are operated in environmental control chambers. The temperature of the ambient air around the LED packages is actively controlled by air flowing through the chamber. T_A : <i>See individual test reports</i> RH : < 45% Air flow : 800 CFM
6. Case temperature	The case temperature measurement point is shown in the XLamp ML-E Soldering & Handling document (AP50).
7. Drive current of the LED light source during life-time test.	<i>See individual test reports. The drive current used during lifetime testing is listed as "Drive Current."</i>
8. Initial luminous flux and forward voltage at photometric measurement current	<i>See individual test reports. The drive current used for luminous flux, forward voltage and chromaticity measurements is listed as "Measurement Current."</i>
9. Lumen maintenance data for each individual LED light source	<i>See individual test reports.</i> Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	<i>See individual test reports.</i>
12. Photometric measurement uncertainty	Cree maintains a tolerance of +/- 2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	<i>See individual test reports.</i> Ambient temperature during chromaticity testing set to 25°C ±2°C.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	175 mA	97.9%	0.0008
2	55°C	55°C	175 mA	96.9%	0.0012
3	85°C	85°C	175 mA	95.5%	0.0012

XLAMP MP-L EASYWHITE LEDS (REV 0)

Revision: 0 (September 30, 2010)

1. Number of LED light sources tested	<i>See individual test reports.</i>
2. Description of LED light sources	XLamp MP-L EasyWhite LEDs (MPLEZW) The XLamp MP-L package contains 3 independent strings of LEDs. All measurements provided are LED package measurements with the 3 strings of LEDs connected in series.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED packages are driven at constant current.
5. Ambient conditions	LED packages are operated in environmental control chambers. The temperature of the ambient air around the LED packages is actively controlled by air flowing through the chamber. T_A : <i>See individual test reports</i> RH : < 45% Air flow : 800 CFM
6. Case temperature	The case temperature measurement point is shown in the XLamp MP-L Soldering & Handling document (AP36).
7. Drive current of the LED light source during life-time test.	<i>See individual test reports. The drive current used during lifetime testing is listed as "Drive Current."</i>
8. Initial luminous flux and forward voltage at photometric measurement current	<i>See individual test reports. The drive current used for luminous flux, forward voltage and chromaticity measurements is listed as "Measurement Current."</i>
9. Lumen maintenance data for each individual LED light source	<i>See individual test reports.</i> Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	<i>See individual test reports.</i>
12. Photometric measurement uncertainty	Cree maintains a tolerance of ±2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	<i>See individual test reports.</i> Ambient temperature during chromaticity testing set to 25°C ±2°C.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	250 mA	96.9%	0.0007
2	55°C	55°C	250 mA	96.1%	0.0012
3	85°C	85°C	250 mA	96.7%	0.0017

XLAMP MX-3 WHITE LEDS (REV 0)

Revision: 0 (March 29, 2011)

1. Number of LED light sources tested	<i>See individual test reports.</i>
2. Description of LED light sources	XLamp MX-3 White LEDs: parallel (MX3AWT) & series (MX3SWT) configurations All measurements provided are LED package measurements of the parallel (MX3AWT) configuration.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED packages are driven at constant current.
5. Ambient conditions	LED packages are operated in environmental control chambers. The temperature of the ambient air around the LED packages is actively controlled by air flowing through the chamber. T_A : <i>See individual test reports</i> RH : < 45% Air flow : 800 CFM
6. Case temperature	The case temperature measurement point is shown in the XLamp MX Family Soldering & Handling document (AP32).
7. Drive current of the LED light source during lifetime test.	<i>See individual test reports. The drive current used during lifetime testing is listed as "Drive Current."</i>
8. Initial luminous flux and forward voltage at photometric measurement current	<i>See individual test reports. The drive current used for luminous flux, forward voltage and chromaticity measurements is listed as "Measurement Current."</i>
9. Lumen maintenance data for each individual LED light source	<i>See individual test reports.</i> Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	<i>See individual test reports.</i>
12. Photometric measurement uncertainty	Cree maintains a tolerance of ±2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	<i>See individual test reports.</i> Ambient temperature during chromaticity testing set to 25°C ±2°C.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	400 mA (MX3AWT) 133 mA (MX3SWT)	98.7%	0.0010
2	55°C	55°C	400 mA (MX3AWT) 133 mA (MX3SWT)	97.0%	0.0013
3	85°C	85°C	400 mA (MX3AWT) 133 mA (MX3SWT)	94.9%	0.0009

XLAMP MX-6 WHITE LEDS (REV 1)

Revision: 1 (September 20, 2010)

1. Number of LED light sources tested	<i>See individual test reports.</i>
2. Description of LED light sources	XLamp MX-6 White LEDs (MX6AWT) All measurements provided are LED package measurements.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED packages are driven at constant current.
5. Ambient conditions	LED packages are operated in environmental control chambers. The temperature of the ambient air around the LED packages is actively controlled by air flowing through the chamber. T_A : <i>See individual test reports</i> RH : < 45% Air flow : 800 CFM
6. Case temperature	The case temperature measurement point is shown in the XLamp MX-6 Soldering & Handling document (AP32).
7. Drive current of the LED light source during life-time test.	<i>See individual test reports. The drive current used during lifetime testing is listed as "Drive Current."</i>
8. Initial luminous flux and forward voltage at photometric measurement current	<i>See individual test reports. The drive current used for luminous flux, forward voltage and chromaticity measurements is listed as "Measurement Current."</i>
9. Lumen maintenance data for each individual LED light source	<i>See individual test reports.</i> Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	<i>See individual test reports.</i>
12. Photometric measurement uncertainty	Cree maintains a tolerance of +/- 2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	<i>See individual test reports.</i> Ambient temperature during chromaticity testing set to 25°C ±2°C.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	350 mA	97.5%	0.0007
2	55°C	55°C	350 mA	98.6%	0.0007
3	85°C	85°C	350 mA	96.5%	0.0014

XLAMP XM-L WHITE LEDS (REV 0)

Revision: 0 (May 13, 2011)

1. Number of LED light sources tested	<i>See individual test reports.</i>
2. Description of LED light sources	XLamp XM-L White LEDs (XMLAWT) All measurements provided are LED package measurements.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED packages are driven at constant current.
5. Ambient conditions	LED packages are operated in environmental control chambers. The temperature of the ambient air around the LED packages is actively controlled by air flowing through the chamber. T_A : <i>See individual test reports</i> RH : < 45% Air flow : 800 CFM
6. Case temperature	The case temperature measurement point is shown in the XLamp XM-L Soldering & Handling document (AP54).
7. Drive current of the LED light source during life-time test.	<i>See individual test reports. The drive current used during lifetime testing is listed as "Drive Current."</i>
8. Initial luminous flux and forward voltage at photometric measurement current	<i>See individual test reports. The drive current used for luminous flux, forward voltage and chromaticity measurements is listed as "Measurement Current."</i>
9. Lumen maintenance data for each individual LED light source	<i>See individual test reports.</i> Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	<i>See individual test reports.</i>
12. Photometric measurement uncertainty	Cree maintains a tolerance of ±2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	<i>See individual test reports.</i> Ambient temperature during chromaticity testing set to 25°C ±2°C.

Test Summary

Data Set	Case Temp. [T _S]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift ($\Delta u'v'$) at 6,000 hours	Reported TM-21 L70 Lifetime
1	45°C	45°C	2000 mA	98.4%	0.0021	L70(6k) > 36,300 hrs
2	55°C	55°C	2000 mA	98.3%	0.0021	L70(6k) > 36,300 hrs
3	85°C	85°C	2000 mA	97.2%	0.0023	L70(6k) > 36,300 hrs

XLAMP XP-E WHITE LEDS (REV 1)

Revision: 1 (September 20, 2010)

1. Number of LED light sources tested	<i>See individual test reports.</i>
2. Description of LED light sources	XLamp XP-E White LEDs (XPEWHT) All measurements provided are LED package measurements.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED packages are driven at constant current.
5. Ambient conditions	LED packages are operated in environmental control chambers. The temperature of the ambient air around the LED packages is actively controlled by air flowing through the chamber. T_A : <i>See individual test reports</i> RH : < 45% Air flow : 800 CFM
6. Case temperature	The case temperature measurement point is shown in the XLamp XP-E Soldering & Handling document (AP25).
7. Drive current of the LED light source during lifetime test.	<i>See individual test reports. The drive current used during lifetime testing is listed as "Drive Current."</i>
8. Initial luminous flux and forward voltage at photometric measurement current	<i>See individual test reports. The drive current used for luminous flux, forward voltage and chromaticity measurements is listed as "Measurement Current."</i>
9. Lumen maintenance data for each individual LED light source	<i>See individual test reports.</i> Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	<i>See individual test reports.</i>
12. Photometric measurement uncertainty	Cree maintains a tolerance of +/- 2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	<i>See individual test reports.</i> Ambient temperature during chromaticity testing set to 25°C ±2°C.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	700 mA	97.7%	0.0012
2	55°C	55°C	700 mA	99.3%	0.0011
3	85°C	85°C	350 mA	97.9%	0.0006
4	85°C	85°C	700 mA	96.6%	0.0015

XLAMP XP-E HIGH EFFICIENCY WHITE LEDS (REV 1)

Revision: 1 (March 8, 2011)

1. Number of LED light sources tested	<i>See individual test reports.</i>
2. Description of LED light sources	XLamp XP-E High Efficiency White LEDs (XPEHEW) All measurements provided are LED package measurements.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED packages are driven at constant current.
5. Ambient conditions	LED packages are operated in environmental control chambers. The temperature of the ambient air around the LED packages is actively controlled by air flowing through the chamber. T_A : <i>See individual test reports</i> RH : < 45% Air flow : 800 CFM
6. Case temperature	The case temperature measurement point is shown in the XLamp XP Family Soldering & Handling document (AP25).
7. Drive current of the LED light source during lifetime test.	<i>See individual test reports. The drive current used during lifetime testing is listed as "Drive Current."</i>
8. Initial luminous flux and forward voltage at photometric measurement current	<i>See individual test reports. The drive current used for luminous flux, forward voltage and chromaticity measurements is listed as "Measurement Current."</i>
9. Lumen maintenance data for each individual LED light source	<i>See individual test reports.</i> Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	<i>See individual test reports.</i>
12. Photometric measurement uncertainty	Cree maintains a tolerance of ±2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	<i>See individual test reports.</i> Ambient temperature during chromaticity testing set to 25°C ±2°C.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	700 mA	99.2%	0.0004
2	55°C	55°C	700 mA	97.4%	0.0004
3	85°C	85°C	700 mA	95.5%	0.0007
4	45°C	45°C	350 mA	99.8%	0.0009
5	55°C	55°C	350 mA	101.0%	0.0007
6	85°C	85°C	350 mA	100.7%	0.0006

XLAMP XP-G WHITE LEDS (REV 2)

Revision: 2 (October 1, 2010)

1. Number of LED light sources tested	<i>See individual test reports.</i>
2. Description of LED light sources	XLamp XP-G White LEDs (XPGWHT) All measurements provided are LED package measurements.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED packages are driven at constant current.
5. Ambient conditions	LED packages are operated in environmental control chambers. The temperature of the ambient air around the LED packages is actively controlled by air flowing through the chamber. T_A : <i>See individual test reports</i> RH : < 45% Air flow : 800 CFM
6. Case temperature	The case temperature measurement point is shown in the XLamp XP-G Soldering & Handling document (AP25).
7. Drive current of the LED light source during lifetime test.	<i>See individual test reports. The drive current used during lifetime testing is listed as "Drive Current."</i>
8. Initial luminous flux and forward voltage at photometric measurement current	<i>See individual test reports. The drive current used for luminous flux, forward voltage and chromaticity measurements is listed as "Measurement Current."</i>
9. Lumen maintenance data for each individual LED light source	<i>See individual test reports.</i> Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	<i>See individual test reports.</i>
12. Photometric measurement uncertainty	Cree maintains a tolerance of ±2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	<i>See individual test reports.</i> Ambient temperature during chromaticity testing set to 25°C ±2°C.

Test Summary

Data Set	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	45°C	45°C	1000 mA	98.7%	0.0032
2	55°C	55°C	350 mA	99.1%	0.0020
3	55°C	55°C	1000 mA	98.6%	0.0009
4	85°C	85°C	350 mA	98.7%	0.0009
5	85°C	85°C	1000 mA	98.7%	0.0015

XLAMP XR-E WHITE LEDS (REV 1)

Revision: 1 (September 20, 2010)

1. Number of LED light sources tested	<i>See individual test reports.</i>
2. Description of LED light sources	XLamp XR-E White LEDs (XREWHT) All measurements provided are LED package measurements.
3. Description of auxiliary equipment	Instrument Systems ISP-500 Integrating Sphere Instrument Systems CAS-140 Spectrometer Keithley 2420 Sourcemeter
4. Operating cycle	LED packages are driven at constant current.
5. Ambient conditions	LED packages are operated in environmental control chambers. The temperature of the ambient air around the LED packages is actively controlled by air flowing through the chamber. T_A : <i>See individual test reports</i> RH : < 45% Air flow : 800 CFM
6. Case temperature	The case temperature measurement point is shown in the XLamp XR-E Soldering & Handling document (AP16).
7. Drive current of the LED light source during lifetime test.	<i>See individual test reports. The drive current used during lifetime testing is listed as "Drive Current."</i>
8. Initial luminous flux and forward voltage at photometric measurement current	<i>See individual test reports. The drive current used for luminous flux, forward voltage and chromaticity measurements is listed as "Measurement Current."</i>
9. Lumen maintenance data for each individual LED light source	<i>See individual test reports.</i> Ambient temperature during luminous flux testing set to 25°C ±2°C.
10. Observation of LED light source failures	No failures occurred during testing.
11. LED light source monitoring interval	<i>See individual test reports.</i>
12. Photometric measurement uncertainty	Cree maintains a tolerance of +/- 2.0% on flux measurements for LM-80 testing.
13. Chromaticity shift reported over the measurement time	<i>See individual test reports.</i> Ambient temperature during chromaticity testing set to 25°C ±2°C.

Test Summary

Data Set	Color	Case Temp. [T _s]	Ambient Temp. [T _A]	Drive Current [I _F]	Average Lumen Maintenance at 6,000 hours	Average Chromaticity Shift (Δu'v') at 6,000 hours
1	Cool White	25°C	25°C	350 mA	98.1%	0.0040
2	Warm White	25°C	25°C	350 mA	98.8%	0.0020
3	Cool White	25°C	25°C	700 mA	98.0%	0.0040
4	Warm White	25°C	25°C	700 mA	97.8%	0.0022
5	Cool White	45°C	45°C	350 mA	97.8%	0.0129
6	Cool White	45°C	45°C	1000 mA	97.9%	0.0017
7	Cool White	55°C	55°C	350 mA	98.0%	0.0031
8	Warm White	55°C	55°C	350 mA	97.7%	0.0019
9	Cool White	55°C	55°C	1000 mA	97.0%	0.0047
10	Warm White	55°C	55°C	1000 mA	96.2%	0.0026
11	Cool White	85°C	85°C	350 mA	94.3%	0.0030
12	Warm White	85°C	85°C	350 mA	96.9%	0.0012
13	Cool White	85°C	85°C	1000 mA	95.0%	0.0022